LET'S REVIEW

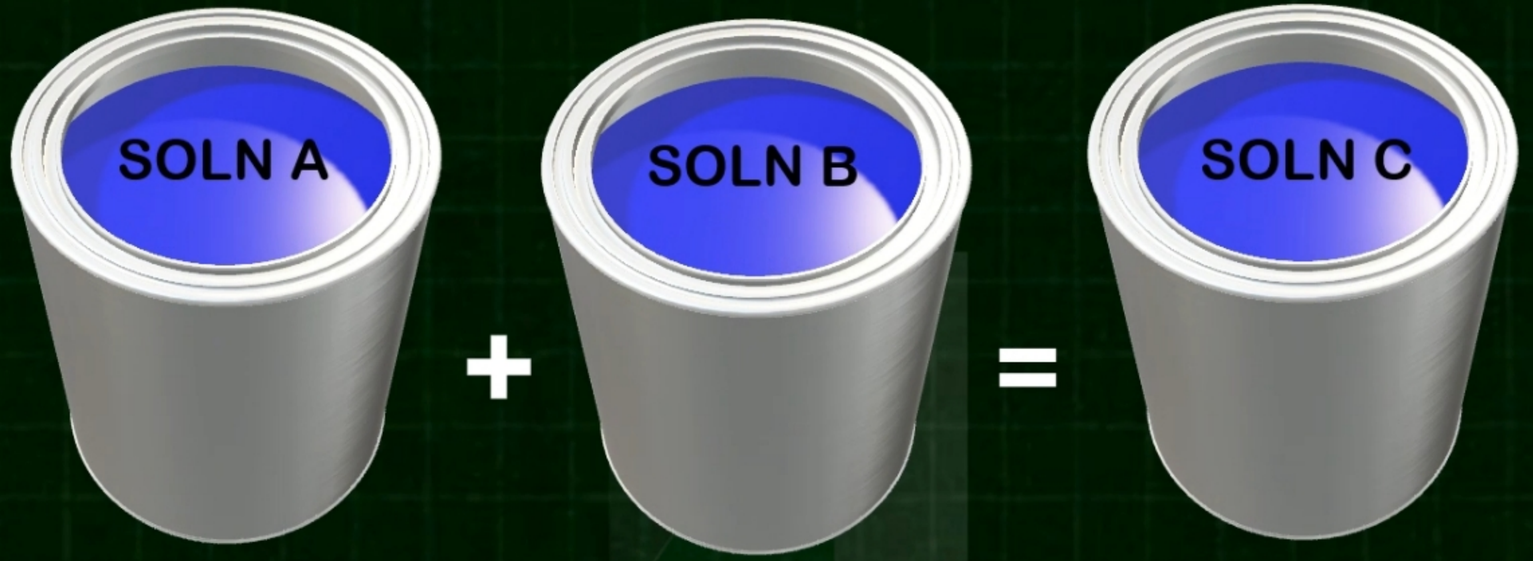
MIXTURE PROBLEMS

ENGR. DARIO A. CALAQUE, JR.

COMPOSITION ANALYSIS:

FINAL MIXTURE

COMPOSITION: x y z



QUANTITY: A B C

QUANTITY EQUATION: $A + B = C$

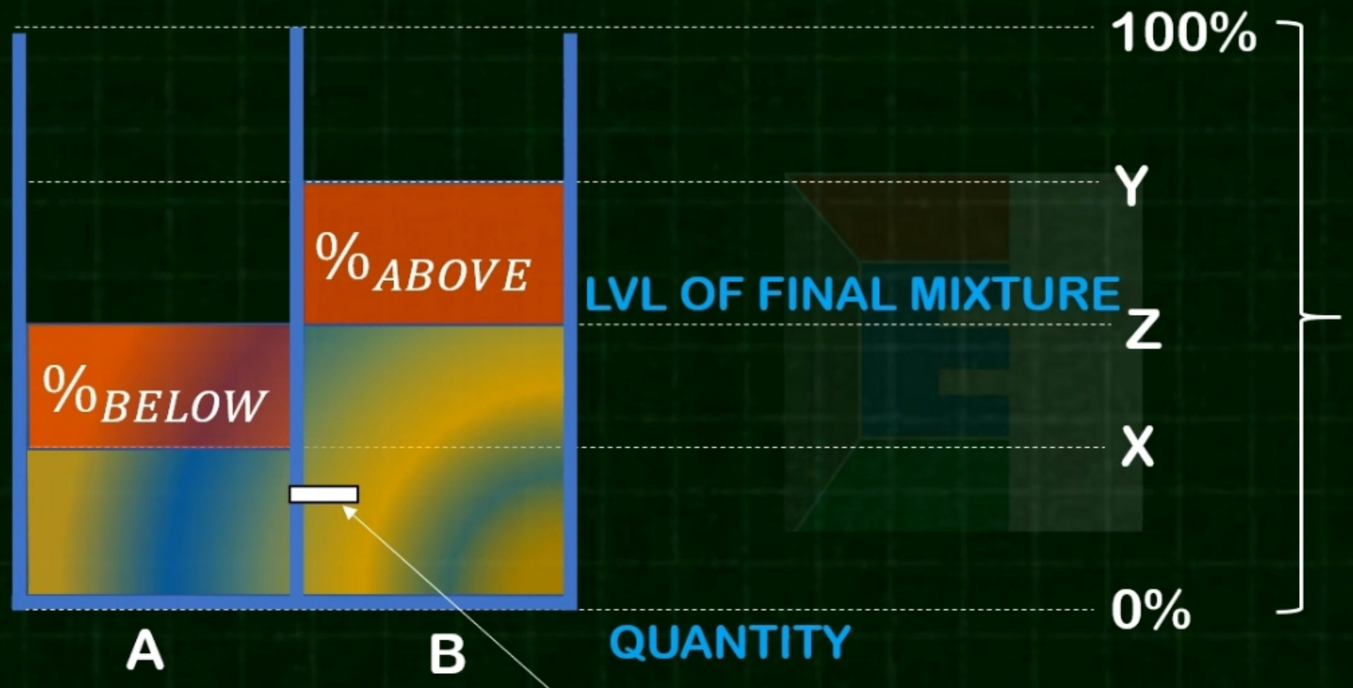
COMPOSITION EQUATION: $Ax + By = Cz$

The number of substances = The number of composition equations.

COMPARTMENT ANALYSIS:

The number of substances = The number of compartment equations.

Consider ONE Substance at a time:



COMPARTMENT EQUATION:

After mixture: $\%_{ABOVE} = \%_{BELOW}$

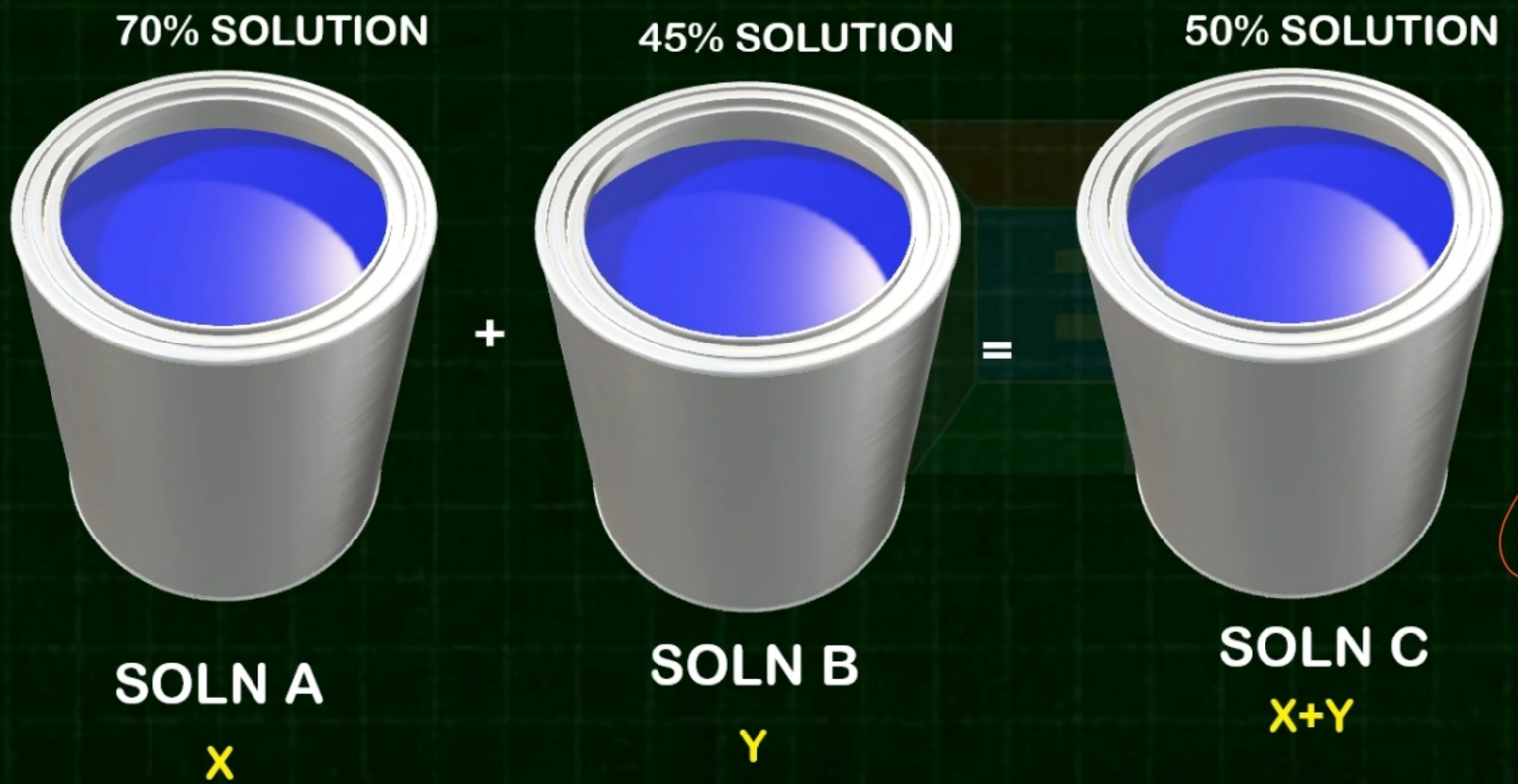
$$A(z - x) = B(y - z)$$

GATE IS OPEN TO ALLOW MIXING OF SOLUTION

PAST CE BOARD EXAM:

FIND THE RATIO BY WHICH A 70% SOLUTION AND 45% SOLUTION MUST BE MIXED IN ORDER TO PRODUCE A 50% SOLUTION.

SOLUTION:



$70\% X + 45\% Y = 50\% (X+Y)$

$70\% X + 45\% Y = 50\% X + 50\% Y$

$70\% X - 50\% X = 50\% Y - 45\% Y$

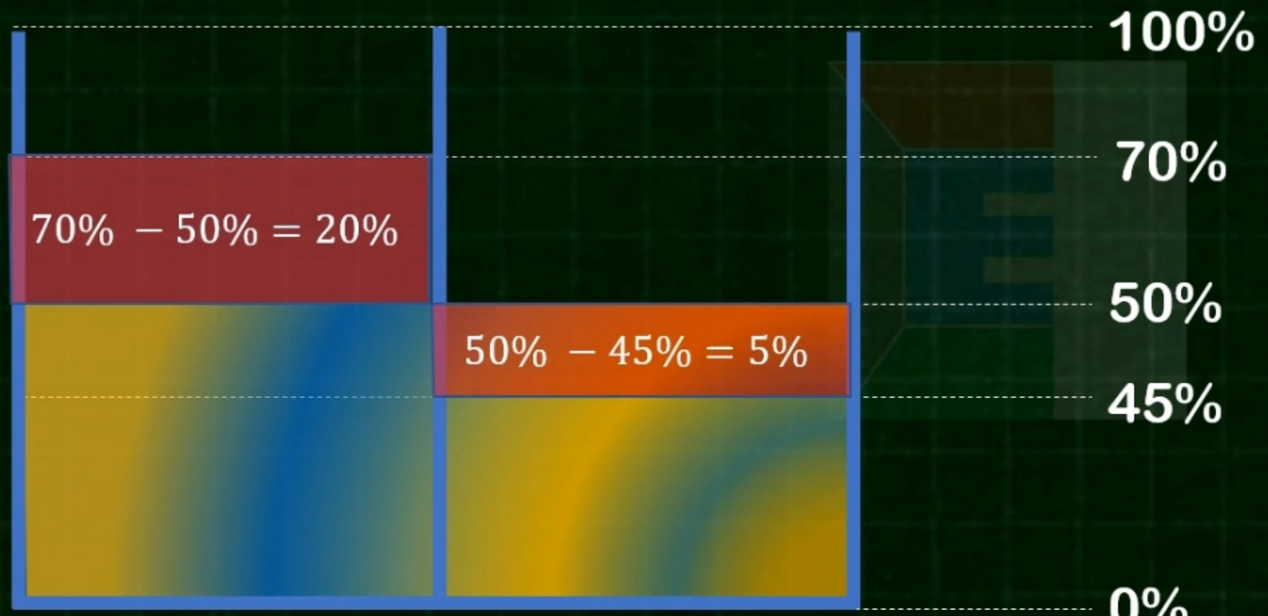
$20\% X = 5\% Y$

$X/Y = 5\%/20\% = 1/4 = 0.25$

PAST CE BOARD EXAM:

FIND THE RATIO BY WHICH A 70% SOLUTION AND 45% SOLUTION MUST BE MIXED IN ORDER TO PRODUCE A 50% SOLUTION.

ALTERNATE SOLUTION:



20% X = 5% Y

X/Y = 5%/20% = ¼ = 0.25

PROBLEM:

A chemist has two alcohol solutions of different strengths, 30% alcohol and 45% alcohol, respectively. How many cc of the 45% alcohol solution must he use to make a mixture of 300cc which contains 39% alcohol?

A $120cc$

B $150cc$

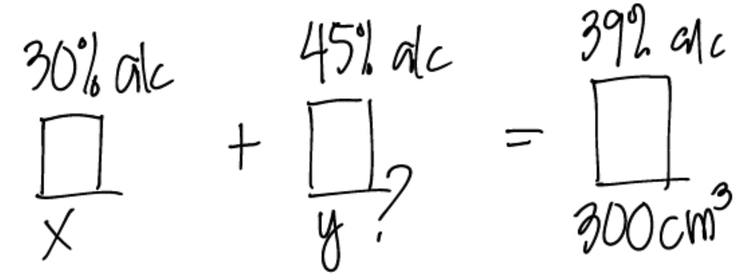
C $180cc$

D $200cc$

PROBLEM:

A chemist has two alcohol solutions of different strengths, 30% alcohol and 45% alcohol, respectively. How many cc of the 45% alcohol solution must he use to make a mixture of 300cc which contains 39% alcohol?

A. 120cc
B. 150cc
C. 180cc
D. 200cc



$x + y = 300$ ..①

$0.30x + 0.45y = 0.39(300)$ ..②

MODE: 5 1

a	b	c
1	1	300
0.30	0.45	0.39(300)

$x = 120$ cc

$y = 180$ cc

PROBLEM:

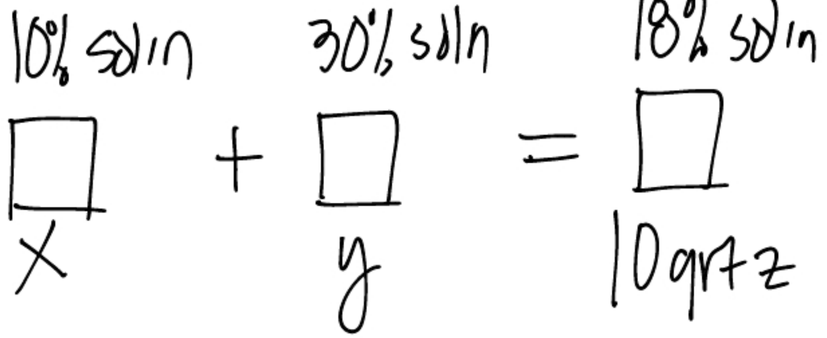
A 10% fungicide solution is mixed with a 30% fungicide solution, to get 10 quartz of an 18% solution. How much of the 10% solution and how much of the 30% solutions were used?

A. 6quarts and 4quartz, respectively

B. 7quarts and 3quartz, respectively

C. 8quarts and 2quartz, respectively

D. 9quarts and 1quart, respectively



MODE: 5 (EQN) 1

a	b	c
1	1	10
0.10	0.30	0.18(10)
x=6	y=4	

Eqn

$x+y=10$

$0.10x+0.30y=0.18(10)$

PROBLEM:

A high concentrated solution having a volume of 100liters is mixed by 75% alcohol, and 25% gasoline. It was found out that a 50%-50%mixture is also appropriate in the solution. How much gasoline should be added to the high concentrated solution in order to have a 50%-50% mixture?

A. 30

B. 50

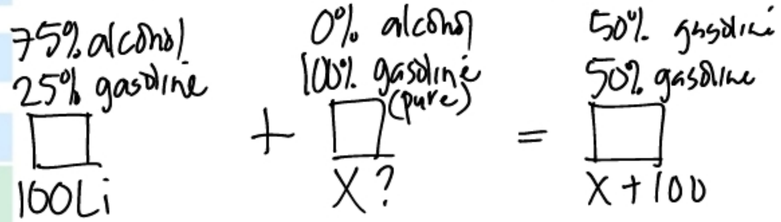
C. 60

D. 70

PROBLEM:

A high concentrated solution having a volume of 100liters is mixed by 75% alcohol, and 25% gasoline. It was found out that a 50%-50%mixture is also appropriate in the solution. How much gasoline should be added to the high concentrated solution in order to have a 50%-50% mixture?

- A. 30
- B. 50
- C. 60
- D. 70



Consider GASOLINE content:

$0.25(100) + 1(X) = 0.50(X+100)$

$X = 50$ liters.

PROBLEM:

A high concentrated solution having a volume of 100liters is mixed by 75% alcohol, and 25% gasoline. It was found out that a 50%-50%mixture is also appropriate in the solution. How much gasoline should be added to the high concentrated solution in order to have a 50%-50% mixture?

A. 30

B. 50

C. 60

D. 70

PAST CE BOARD EXAM:

HOW MUCH TIN AND HOW MUCH LEAD MUST BE ADDED TO 700KGS OF AN ALLOY CONTAINING 50% TIN AND 25% LEAD TO MAKE AN ALLOY WHICH IS 60% TIN AND 20% LEAD?

a) 175kgs TIN, no lead needed

b) No tin needed, 175kgs LEAD

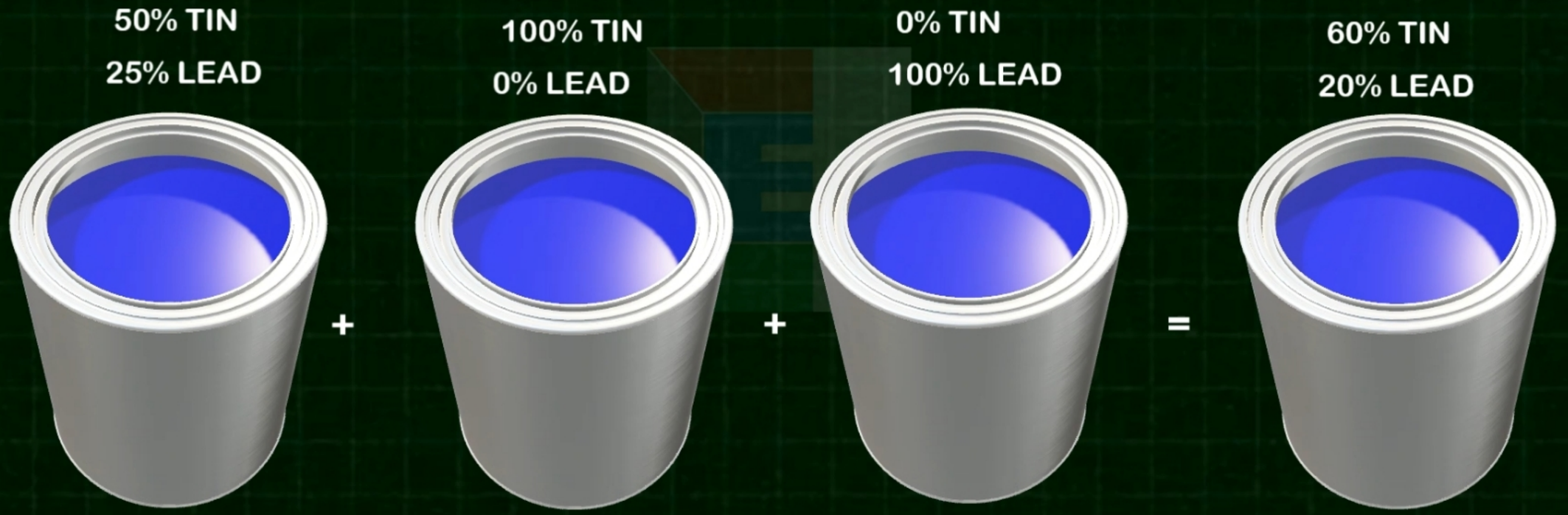
c) 275kgs TIN, no lead needed

d) No tin needed, 275kgs LEAD

PAST CE BOARD EXAM:

HOW MUCH TIN AND HOW MUCH LEAD MUST BE ADDED TO 700KGS OF AN ALLOY CONTAINING 50% TIN AND 25% LEAD TO MAKE AN ALLOY WHICH IS 60% TIN AND 20% LEAD?

SOLUTION:



PAST CE BOARD EXAM:

HOW MUCH TIN AND HOW MUCH LEAD MUST BE ADDED TO 700KGS OF AN ALLOY CONTAINING 50% TIN AND 25% LEAD TO MAKE AN ALLOY WHICH IS 60% TIN AND 20% LEAD?

SOLUTION:

50% TIN 25% LEAD	+	100% TIN 0% LEAD	+	0% TIN 100% LEAD	=	60% TIN 20% LEAD
ALLOY 700KGS		TIN X		LEAD Y		ALLOY 700+X+Y

Considering Tin Content:

$$0.50(700) + 1(x) + 0(y) = 0.60(700+x+y) \ldots \text{eq'n (1)}$$

Considering Lead Content:

$$0.25(700) + 0(x) + 1(y) = 0.20(700+x+y) \ldots \text{eq'n (2)}$$

$x = 175$ kgs tin $y = 0$ lead

MODE: 5

a(x)	b(y)	c
1 − 0.6	0 − 0.6	0.6(700) − 0.5(700)
0 − 0.2	1 − 0.2	0.2(700) − 0.25(700)

PAST CE BOARD EXAM:

HOW MUCH TIN AND HOW MUCH LEAD MUST BE ADDED TO 700KGS OF AN ALLOY CONTAINING 50% TIN AND 25% LEAD TO MAKE AN ALLOY WHICH IS 60% TIN AND 20% LEAD?

SOLUTION:

50% TIN 25% LEAD	+	100% TIN 0% LEAD	+	0% TIN 100% LEAD	=	60% TIN 20% LEAD
ALLOY 700KGS		TIN X		LEAD Y		ALLOY 700+X+Y

Considering Tin Content:

$$0.50(700) + 1(x) + 0(y) = 0.60(700+x+y) \text{ ...eq'n (1)}$$

Considering Lead Content:

$$0.25(700) + 0(x) + 1(y) = 0.20(700+x+y) \text{ ...eq'n (2)}$$

Solving 2equations, 2 unknowns, we'll get:

X= 175KGS TIN Y = 0 (NO LEAD NEEDED)

TEST YOURSELF:

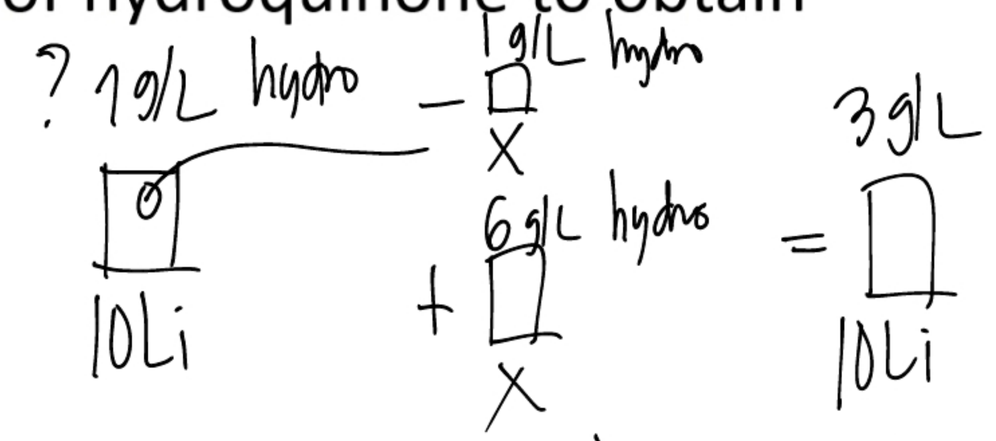
Through a mistake in mixing, a 10-liter tank of photographic developer is found to contain only 1 gram per liter of hydroquinone instead of the desired 3 grams per liter. How much of this developer must be drawn off and replaced with another developer containing 6 grams per liter of hydroquinone to obtain the desired mixture?

A. 4 liters ✓

B. 3.5 liters X

C. 6 liters X

D. 5.5 liters



$10(1) - X(1) + X(6) = 10(3)$

$X = 4$ liters ans.

LET'S REVIEW

COIN PROBLEMS

ENGR. DARIO A. CALAQUE, JR.

COIN TERMINOLOGIES:

1PENNY = 1 CENT

1 NICKEL = 5CENTS

1 DIME = 10CENTS

1 QUARTER = 25CENTS

1 HALF DOLLAR = 50CENTS

1 DOLLAR = 100CENTS

Pendulum

COIN TERMINOLOGIES:

1PENNY = 1 CENT

1 NICKEL = 5CENTS

1 DIME = 10CENTS

1 QUARTER = 25CENTS

1 HALF DOLLAR = 50CENTS

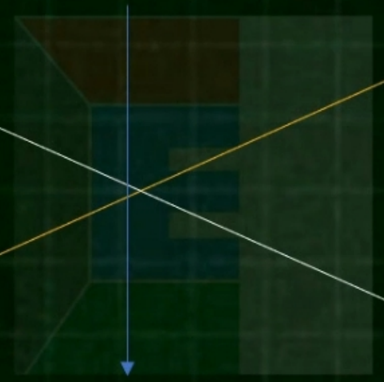
1 DOLLAR = 100CENTS

COIN MATHEMATICAL EXPRESSIONS

To create a mathematical equation, let's paraphrase the given expression:

IT MEANS "THE NUMBER OF X IS DOUBLE THE NUMBER OF Y"

"TWICE AS MANY X AS Y"



$$X = 2Y$$

COIN MATHEMATICAL EQUATION

PREPARED BY: ENGR. DARIO A. CALAQUE, JR.

COIN MATHEMATICAL EXPRESSIONS

IT MEANS "THE NUMBER OF DIMES IS DOUBLE THE NUMBER OF QUARTERS"

"TWICE AS MANY DIMES AS QUARTERS"

$$d = 2q$$

COIN MATHEMATICAL EQUATION

PREPARED BY: ENGR. DARIO A. CALAQUE, JR.

COIN MATHEMATICAL EXPRESSIONS

IT MEANS "THE NUMBER OF QUARTERS IS TRIPLE THE NUMBER OF DIMES"

THREE TIMES AS MANY QUARTERS AS DIMES

$$q = 3d$$

COIN MATHEMATICAL EQUATION

PREPARED BY: ENGR. DARIO A. CALAQUE, JR.

COIN FACE VALUE:

1PENNY = 0.01 p

1 NICKEL = 0.05 n

1 DIME = 0.1 d

1 QUARTER = 0.25 q

1 HALF DOLLAR = 0.5 h

1 DOLLAR = 1dol

"A COLLECTION OF 70COINS CONSISTING OF DIMES, QUARTERS AND HALF DOLLARS HAS A VALUE OF $17.75.

IN TERMS OF FACE VALUE:

$$0.10d + 0.25q + 0.5h = 17.75$$

$$d + q + h = 70$$

EXAMPLE:

JACOB HAS $3.50 IN NICKELS AND DIMES. HE HAS TWICE AS MANY DIMES AS NICKELS. HOW MANY NICKELS AND HOW MANY DIMES DOES HE HAVE?

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JACOB HAS $3.50 IN NICKELS AND DIMES. HE HAS TWICE AS MANY DIMES AS NICKELS. HOW MANY NICKELS AND HOW MANY DIMES DOES HE HAVE?

SOLUTION:

Let:

n = Number of Nickels

d = Number of Dimes

COIN FACE VALUE:

1PENNY = 0.01 p
1 NICKEL = 0.05 n
1 DIME = 0.1 d
1 QUARTER = 0.25 q
1 HALF DOLLAR = 0.5 h
1 DOLLAR = 1d

Considering 1st Statement:

JACOB HAS $3.50 IN NICKELS AND DIMES. HE HAS TWICE AS MANY DIMES AS NICKELS. HOW MANY NICKELS AND HOW MANY DIMES DOES HE HAVE?

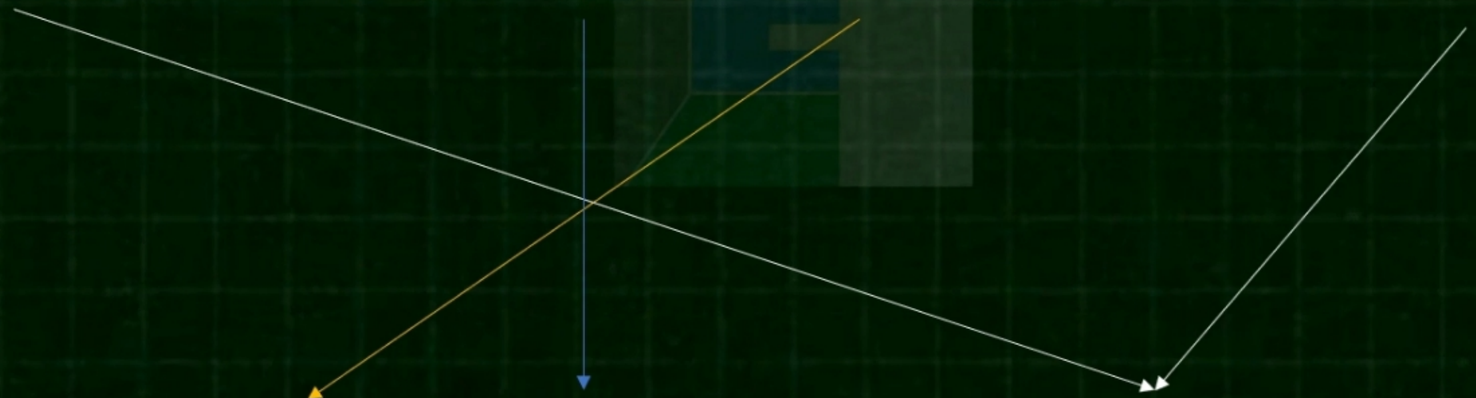
$$0.05n + 0.1d = 3.50 \ldots \text{eq'n (1)}$$

EXAMPLE:

JACOB HAS $3.50 IN NICKELS AND DIMES. HE HAS TWICE AS MANY DIMES AS NICKELS. HOW MANY NICKELS AND HOW MANY DIMES DOES HE HAVE?

IT MEANS "THE NUMBER OF DIMES IS DOUBLE THE NUMBER OF NICKELS"

"TWICE AS MANY DIMES AS NICKELS"



$$d = 2n \quad \text{...eq'n (2)}$$

COIN MATHEMATICAL EQUATION

EXAMPLE:

JACOB HAS $3.50 IN NICKELS AND DIMES. HE HAS TWICE AS MANY DIMES AS NICKELS. HOW MANY NICKELS AND HOW MANY DOES HE HAVE?

KEY EQUATIONS:

$$0.05n + 0.1d = 3.50 \quad \text{...eq'n (1)}$$

$$d = 2n \quad \text{...eq'n (2)}$$

MODE: 5 1

a(n)	b(d)	c
0.05	0.1	3.5
-2	1	0

x = n y = d =

EXAMPLE:

JACOB HAS $3.50 IN NICKELS AND DIMES. HE HAS TWICE AS MANY DIMES AS NICKELS. HOW MANY NICKELS AND HOW MANY DOES HE HAVE?

KEY EQUATIONS:

$$0.05n + 0.1d = 3.50 \ldots \text{eq'n (1)}$$

$$d = 2n \qquad \ldots \text{eq'n (2)}$$

Solving 2 equations, 2 unknowns:

n = 14nickels
d = 28dimes

TEST YOURSELF:

Your uncle walks in, jingling the coins in his pocket. He grins at you and tells you that you can have all the coins if you can figure out how many of each kind of coin he is carrying. You're not too interested until he tells you that he's been collecting those gold-tone one dollar coins. The twenty-six coins in his pocket are all dollars and quarters, and they add up to seventeen dollars in value. How many of quarters does he have?

$17

$(\$1)d + q = 26 \quad \cdots ①$

$1(\$1)d + 0.25q = \$17 \quad \cdots ②$

MODE: 5 1

$x = \$1 = 14 \quad y = 12$ qtrs

A 10

B 14

C 12

D 16

TEST YOURSELF:

Your uncle walks in, jingling the coins in his pocket. He grins at you and tells you that you can have all the coins if you can figure out how many of each kind of coin he is carrying. You're not too interested until he tells you that he's been collecting those gold-tone one dollar coins. The twenty-six coins in his pocket are all dollars and quarters, and they add up to seventeen dollars in value. How many of quarters does he have?

A 10

C 12

B 14

D 16

TEST YOURSELF:

Adalberto has 2.25dollars in dimes and nickels in his pocket. He has nine more nickels than dimes. How many dimes does he have?

A 12

B 21

C 13

D 31

TEST YOURSELF:

Adalberto has 2.25dollars in dimes and nickels in his pocket. He has nine more nickels than dimes. How many dimes does he have?

A. 12

B. 21

C. 13

D. 31

$0.1d + 0.05n = \$2.25 \ldots (1)$

$n = d + 9 \ldots (2)$

MODE: 5 1

a (d)	b (n)	c
0.1	0.05	2.25
−1	1	9

$x = d = 12$ dimes (answer)

$y = n = 21$ nickels

TEST YOURSELF:

Danny has 2.14dollars worth of pennies and nickels in his piggy bank. The number of nickels is two more than ten times the number of pennies. How many pennies does Danny have?

- A. 4
- B. 42
- C. 6
- D. 62

$0.01p + 0.05n = \$2.14 \ldots ①$

$n = 10p + 2 \quad = 2 + 10p \ldots ②$

Mode: 5 1

$p = 4$ penny $\quad n = 42$ nickels

TEST YOURSELF:

A piggy bank contains 30coins consisting of quarters and dimes. The total value of the coins is 5.25dollars. How many quarters and dimes are in the piggy bank?

- A Both 10
- B Both 16
- C Both 14
- D Both 15

$q + d = 30 \ldots ①$

$0.25q + 0.1d = \$5.25 \ldots ②$

Mode: 5 1

$q = 15 \quad d = 15$

PROBLEM:

A COLLECTION OF 70COINS CONSISTING OF DIMES, QUARTERS AND HALF-DOLLARS HAS A VALUE OF $17.75. THERE ARE 3 TIMES AS MANY QUARTERS AS DIMES. FIND THE NUMBER OF EACH KIND OF COIN.

a) d = 15dimes q = 10quarters h = 45half-dollars

b) d = 45dimes q = 10quarters h = 15half-dollars

c) d = 10dimes q = 15quarters h = 45half-dollars

d) d = 15dimes q = 45quarters h = 10half-dollars ans.

EXAMPLE:

A COLLECTION OF 70COINS CONSISTING OF DIMES, QUARTERS AND HALF-DOLLARS HAS A VALUE OF $17.75. THERE ARE 3 TIMES AS MANY QUARTERS AS DIMES. FIND THE NUMBER OF EACH KIND OF COIN.

$d + q + h = 70 \quad \ldots (1)$

$0.1d + 0.25q + 0.5h = 17.75 \quad \ldots (2)$

$q = 3d \quad \ldots (3)$

MODE: 5 2

a (d)	b (q)	c (h)	d
1	1	1	70
0.1	0.25	0.5	17.75
-3	1	0	0

$X = 15$ dimes $\quad y = 45$ qrtrs $\quad z = 10$ half dollars

LET'S REVIEW

AGE PROBLEMS

ENGR. DARIO A. CALAQUE, JR.

ANALYSIS:

10years ago **Now** **In 3 years**

(Past Age) – (Present Age) + (Future Age)

X-10 **X** **X+3**

It is better to let the present age be your reference.
Just use (+) if age referred is future
and use (-) if the age referred to is past.

ANALYSIS:

Time Modifiers:

(Past Age) – (Present Age) + (Future Age)

was	is	will
were	are	shall
ago	am	be
last	now	further
yesteryear	being	hence
Verbs in the past tense	Verbs in the present tense	Verbs in the future tense

Time Modifiers

14days	Fortnight
1year	Annum
2years	Biennium
5years	Lustrum
10years	Decade
20years	Score
25years	Silver
50years	Golden
75years	Diamond
100years	Century or Centennial
1000years	Millennium

PAST CE BOARD EXAM:

A MAN IS 4 TIMES AS OLD AS HIS SON NOW. SIX YEARS AGO HE WAS 7 TIMES AS OLD AS HIS SON DURING THAT TIME. FIND THEIR PRESENT AGE.

PAST CE BOARD EXAM:

A MAN IS 4 TIMES AS OLD AS HIS SON NOW. SIX YEARS AGO HE WAS 7 TIMES AS OLD AS HIS SON DURING THAT TIME. FIND THEIR PRESENT AGE.

SOLUTION:

Let M = Man's Present Age

S = Son's Present Age

Formulate Mathematical Equations:

Considering 1st Statement:

A MAN | IS | 4 TIMES AS OLD AS HIS SON | NOW.

$$M = 4S \quad \text{... eq'n (1)}$$

(M: Present age; $4S$: Present age)

PAST CE BOARD EXAM:

A MAN IS 4 TIMES AS OLD AS HIS SON NOW. SIX YEARS AGO HE WAS 7 TIMES AS OLD AS HIS SON DURING THAT TIME. FIND THEIR PRESENT AGE.

SOLUTION:

Let M = Man's Present Age

S = Son's Present Age

Formulate Mathematical Equations:

Considering 2nd Statement:

A MAN IS 4 TIMES AS OLD AS HIS SON NOW. SIX YEARS AGO HE WAS 7 TIMES AS OLD AS HIS SON DURING THAT TIME. FIND THEIR PRESENT AGE.

$$(M - 6) = 7(S - 6)$$

(M - 6): Age, Six Years Ago

7(S - 6): Age, Six Years Ago

PAST CE BOARD EXAM:

A MAN IS 4 TIMES AS OLD AS HIS SON NOW. SIX YEARS AGO HE WAS 7 TIMES AS OLD AS HIS SON DURING THAT TIME. FIND THEIR PRESENT AGE.

KEY EQUATIONS:

$$M = 4S \quad \text{... eq'n (1)}$$

$$(M - 6) = 7(S - 6) \quad \text{... eq'n (2)}$$

SOLVING TWO EQUATIONS, TWO UNKNOWNS

M= 48yrs. old

S= 12yrs. old

MODE: 5

a(M)	b(S)	c
1	−4	0
1	−7	7(−6)+6

$x = M = 48$ $y = S = 12$

PAST CE BOARD EXAM:

TWO YEARS AGO, A BOY IS 2/3 AS OLD AS HIS SISTER. IN TWO YEARS, THE BOY WILL BE ¾ AS OLD AS SHE. HOW OLD ARE THEY?

PREPARED BY: ENGR. DARIO A. CALAQUE, JR.

PAST CE BOARD EXAM:

TWO YEARS AGO, A BOY IS 2/3 AS OLD AS HIS SISTER. IN TWO YEARS, THE BOY WILL BE ¾ AS OLD AS SHE. HOW OLD ARE THEY?

SOLUTION:

Let B = Boy's Present Age

S = Sister's Present Age

Formulate Mathematical Equations:

Considering 1st Statement:

TWO YEARS AGO,	A BOY	IS	2/3 AS OLD AS HIS SISTER.

$$\underbrace{(B-2)}_{\text{Age, 2 years ago}} = \frac{2}{3}\underbrace{(S-2)}_{\text{Age, 2 years ago}} \quad \text{... eq'n (1)}$$

PAST CE BOARD EXAM:

TWO YEARS AGO, A BOY IS 2/3 AS OLD AS HIS SISTER. IN TWO YEARS, THE BOY WILL BE ¾ AS OLD AS SHE. HOW OLD ARE THEY?

SOLUTION:

Let B = Boy's Present Age

S = Sister's Present Age

Formulate Mathematical Equations:

Considering 2nd Statement:

TWO YEARS AGO, A BOY IS 2/3 AS OLD AS HIS SISTER. IN TWO YEARS, THE BOY WILL BE ¾ AS OLD AS SHE. HOW OLD ARE THEY?

$$\underbrace{(B+2)}_{\text{Age, In 2 years}} = \frac{3}{4}\underbrace{(S+2)}_{\text{Age, In 2 years}} \quad \text{... eq'n (2)}$$

PAST CE BOARD EXAM:

TWO YEARS AGO, A BOY IS 2/3 AS OLD AS HIS SISTER. IN TWO YEARS, THE BOY WILL BE ¾ AS OLD AS SHE. HOW OLD ARE THEY?

KEY EQUATIONS:

$$\underbrace{(B-2)}_{\text{Age, 2 years ago}} = \frac{2}{3}\underbrace{(S-2)}_{\text{Age, 2 years ago}} \quad \text{... eq'n (1)}$$

$$\underbrace{(B+2)}_{\text{Age, In 2 years}} = \frac{3}{4}\underbrace{(S+2)}_{\text{Age, In 2 years}} \quad \text{... eq'n (2)}$$

MODE: 5 1

a(B)	b(S)	C
1	(2÷3)	$(\frac{2}{3})(-2)$ +2
1	(3÷4)	$(\frac{3}{4})(2)$ −2

SOLVING TWO EQUATIONS, TWO UNKNOWNS

PAST CE BOARD EXAM:

TWO YEARS AGO, A BOY IS 2/3 AS OLD AS HIS SISTER. IN TWO YEARS, THE BOY WILL BE ¾ AS OLD AS SHE. HOW OLD ARE THEY?

KEY EQUATIONS:

$$\underset{\text{Age, 2 years ago}}{(B-2)} = \frac{2}{3}\underset{\text{Age, 2 years ago}}{(S-2)} \quad \text{... eq'n (1)}$$

$$\underset{\text{Age, In 2 years}}{(B+2)} = \frac{3}{4}\underset{\text{Age, In 2 years}}{(S+2)} \quad \text{... eq'n (2)}$$

SOLVING TWO EQUATIONS, TWO UNKNOWNS

B= 10yrs. old **S= 14yrs. old**

TEST YOURSELF:

Wence is 5 years older than Levi. In 5 years the product of their ages will be 1.5 times the product of their present ages. How old is Levi now?

A 30

B 20

C 15

D 10

TEST YOURSELF:

W

Wence is 5 years older than Levi. In 5 years the product of their ages will be 1.5 times the product of their present ages. How old is Levi now?

L

A 30

B 20

C 15

D 10

$W = L + 5$

$(L+5)(W+5) = 1.5LW$

$(L+5)(L+5+5) = 1.5L(L+5)$

$\therefore L = 20$ yrs old.

TEST YOURSELF:

I am now 36. When I was as old as you are now, I am twice your age that time. How old are you now?

A 16

B 24

C 30

D 32

TEST YOURSELF:

I am now 36. When I was as old as you are now, I am twice your age that time. How old are you now?

- A 16
- B 24
- C 30
- D 32

$$36 - X = X - \frac{X}{2}$$

$$\boxed{X = 24 \text{ yrs old.}}$$

	PAST	PRESENT
I	X	36
YOU	X/2	X

$$I_{past} = 2\,YOU_{past}$$

$$YOU_{past} = \frac{I_{past}}{2}$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FAT GEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

NOTE: CENTURY = 100YEARS

Solution:

Let F = Father's Age

M = Mother's Age

E = Eldest Child's Age

S = Second Child's Age

T = Third Child's Age

L = Last Child's Age

Considering 1st Statement:

$$F+M+E+S+T+L = 40 + 100 \quad \text{...EQ'N (1)}$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF T LE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CH ND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

NOTE: 1 DECADE = 10YEARS

Solution:

Let F = Father's Age
M = Mother's Age
E = Eldest Child's Age
S = Second Child's Age
T = Third Child's Age
L = Last Child's Age

Considering 1st Statement:

$$F+M+E+S+T+L = 40 + 100 \quad \text{...EQ'N (1)}$$

Considering 2ND Statement:

$$(F-10)+(M-10)+(E-10)+(S-10)=140 - [5(10)+5] \quad \text{...EQ'N (2)}$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Let F = Father's Age

M = Mother's Age

E = Eldest Child's Age

S = Second Child's Age

T = Third Child's Age

L = Last Child's Age

Considering 3RD Statement:

$$F = 10L \quad \text{...EQ'N (3)}$$

$$M = 8L \quad \text{...EQ'N (4)}$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Let F = Father's Age

M = Mother's Age

E = Eldest Child's Age

S = Second Child's Age

T = Third Child's Age

L = Last Child's Age

Considering 4TH Statement:

$$S - (T+L) = 0 \quad \text{...EQ'N (5)}$$

$$E - (S+L) = 0 \quad \text{...EQ'N (6)}$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Let F = Father's Age
M = Mother's Age
E = Eldest Child's Age
S = Second Child's Age
T = Third Child's Age
L = Last Child's Age

Considering 1st Statement:

$$F+M+E+S+T+L = 40 + 100 \quad \text{...EQ'N (1)}$$

Considering 2ND Statement:

$$(F-10)+(M-10)+(E-10)+(S-10)=140 - [5(10)+5] \quad \text{...EQ'N (2)}$$

Considering 3RD Statement:

$$F = 10L \quad \text{...EQ'N (3)}$$

$$M = 8L \quad \text{...EQ'N (4)}$$

Considering 4TH Statement:

$$S - (T+L) =0 \quad \text{...EQ'N (5)}$$

$$E - (S+L) =0 \quad \text{...EQ'N (6)}$$

6 eqn's, 6 unknowns.

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution: $F+M+E+S+T+L = 40 + 100$ ...EQ'N (1)

$F = 10L$ ...EQ'N (3)

$M = 8L$ ...EQ'N (4)

$E = (S+L)$ ...EQ'N (6)

$S = (T+L)$ ...EQ'N (5)

$10L + 8L + ((T+L)+L) + (T+L) + T + L = 140$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution: $F+M+E+S+T+L = 40 + 100$ ...EQ'N (1)

$F = 10L$ ...EQ'N (3)

$M = 8L$ ...EQ'N (4)

$E = (S+L)$ ...EQ'N (6)

$S = (T+L)$ ...EQ'N (5)

$22L + 3T = 140$ ...EQ'N (A)

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Considering 2ND Statement:

$$(F-10)+(M-10)+(E-10)+(S-10)=140-[5(10)+5] \quad \text{...EQ'N (2)}$$

$$F = 10L \quad \text{...EQ'N (3)}$$

$$M = 8L \quad \text{...EQ'N (4)}$$

$$E = (S+L) \quad \text{...EQ'N (6)}$$

$$S = (T+L) \quad \text{...EQ'N (5)}$$

$$F + M + E + S = 140 - 55 + 10 + 10 + 10 + 10$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Considering 2ND Statement:

$$(F-10)+(M-10)+(E-10)+(S-10)=140-[5(10)+5] \quad \text{...EQ'N (2)}$$

$$F = 10L \quad \text{...EQ'N (3)}$$

$$M = 8L \quad \text{...EQ'N (4)}$$

$$E = (S+L) \quad \text{...EQ'N (6)}$$

$$S = (T+L) \quad \text{...EQ'N (5)}$$

$$F + M + E + S = 125$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Considering 2ND Statement:

$$(F-10)+(M-10)+(E-10)+(S-10)=140-[5(10)+5] \quad \text{...EQ'N (2)}$$

$$F = 10L \quad \text{...EQ'N (3)}$$

$$M = 8L \quad \text{...EQ'N (4)}$$

$$E = (S+L) \quad \text{...EQ'N (6)}$$

$$S = (T+L) \quad \text{...EQ'N (5)}$$

$$10L + 8L + ((T+L) + L) + (T+L) = 125$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Considering 2ND Statement:

$$(F-10)+(M-10)+(E-10)+(S-10)=140-[5(10)+5] \quad \text{...EQ'N (2)}$$

$$F = 10L \quad \text{...EQ'N (3)}$$

$$M = 8L \quad \text{...EQ'N (4)}$$

$$E = (S+L) \quad \text{...EQ'N (6)}$$

$$S = (T+L) \quad \text{...EQ'N (5)}$$

$$21L + 2T = 125 \quad \text{...EQ'N (B)}$$

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Let F = Father's Age

M = Mother's Age — MARRIED COUPLE

E = Eldest Child's Age

S = Second Child's Age

T = Third Child's Age

L = Last Child's Age — THEIR FOUR CHILDREN

SOLVING TWO EQUATIONS, TWO UNKNOWNS

$22L + 3T = 140$ ...EQ'N (A)

$21L + 2T = 125$ ...EQ'N (B)

L= 5yrs.old

T= 10yrs.old

PAST CE BOARD EXAM:

THE SUM OF THE AGES OF A MARRIED COUPLE AND THEIR FOUR CHILDREN IS 40 YEARS OVER THE CENTURY MARK. TEN YEARS AGO, THE SUM OF THE AGES OF THE COUPLE, THE ELDEST CHILD AND THE SECOND CHILD IS 5DECADES AND FIVE YEARS LESS THAN THE SUM OF ALL (THE SIX OF THEM) THEIR AGES NOW. THE FATHER'S AGE IS 10TIMES THE AGE OF THE YOUNGEST WHILE THE MOTHER'S AGE IS 8 TIMES THAT OF THE YOUNGEST. THE DIFFERENCE BETWEEN THE AGE OF THE SECOND CHILD AND THE SUM OF THE AGES OF THE THIRD AND THE LAST CHILD IS ZERO, WHILE THE DIFFERENCE BETWEEN THE AGES OF THE FIRST CHILD AND THE SUM OF THE AGES OF THE SECOND AND THE LAST CHILD IS ZERO. FIND THEIR AGES NOW.

Solution:

Let F = Father's Age
M = Mother's Age
E = Eldest Child's Age
S = Second Child's Age
T = Third Child's Age
L = Last Child's Age

$F = 10L$ ...EQ'N (3) = 10(5)=50yrs.old

$M = 8L$ ...EQ'N (4) = 8(5)=40yrs.old

$E = (S+L)$ ...EQ'N (6) = 15+5=20yrs.old

$S = (T+L)$ ...EQ'N (5) = 10+5=15yrs.old

$T = 10\text{yrs.old}$

$L = 5\text{yrs.old}$

PAST CE BOARD EXAM:

THE AGE OF DIAPHANTUS, A GREEK MATHEMATICIAN OF ABOUT 250A.D MAYBE CALCULATED FROM THE EPITAH WHICH READS AS FOLLOWS:

"DIAPHANTUS PASSED ONE-SIXTH OF HIS LIFE IN CHILDHOOD, ONE-TWELVE IN YOUTH, AND ONE-SEVENTH AS A BACHELOR. FIVE YEARS AFTER HIS MARRIAGE WAS BORN A SON, WHO DIED FOUR YEARS BEFORE HIS FATHER AT HALF HIS FATHER'S FINAL AGE. HOW OLD WAS DIAPHANTUS WHEN HE DIED?

PAST CE BOARD EXAM:

THE AGE OF DIAPHANTUS, A GREEK MATHEMATICIAN OF ABOUT 250A.D MAYBE CALCULATED FROM THE EPITAH WHICH READS AS FOLLOWS: "DIAPHANTUS PASSED ONE-SIXTH OF HIS LIFE IN CHILDHOOD, ONE-TWELVE IN YOUTH, AND ONE-SEVENTH AS A BACHELOR. FIVE YEARS AFTER HIS MARRIAGE WAS BORN A SON, WHO DIED FOUR YEARS BEFORE HIS FATHER AT HALF HIS FATHER'S FINAL AGE. HOW OLD WAS DIAPHANTUS WHEN HE DIED?

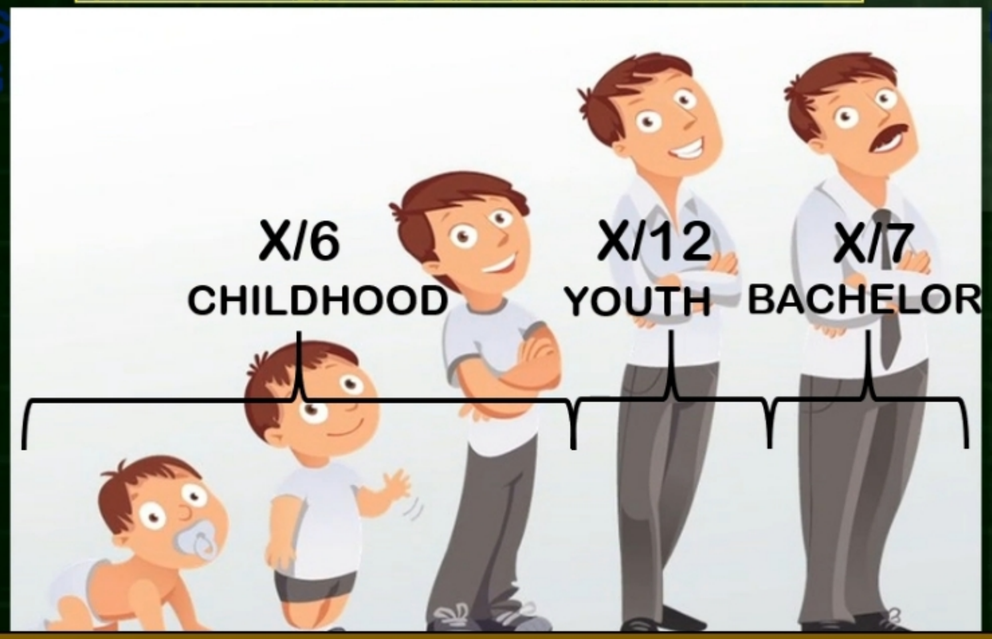
SOLUTION:

Let X = Final Age of Diaphantus

Formulate Mathematical Equations:

Consider 1st Statement:

"DIAPHANTUS PASSED ONE-SIXTH OF HIS LIFE IN CHILDHOOD, ONE-TWELVE IN YOUTH, AND ONE-SEVENTH AS A BACHELOR.



Stages of Diaphantus Life

PAST CE BOARD EXAM:

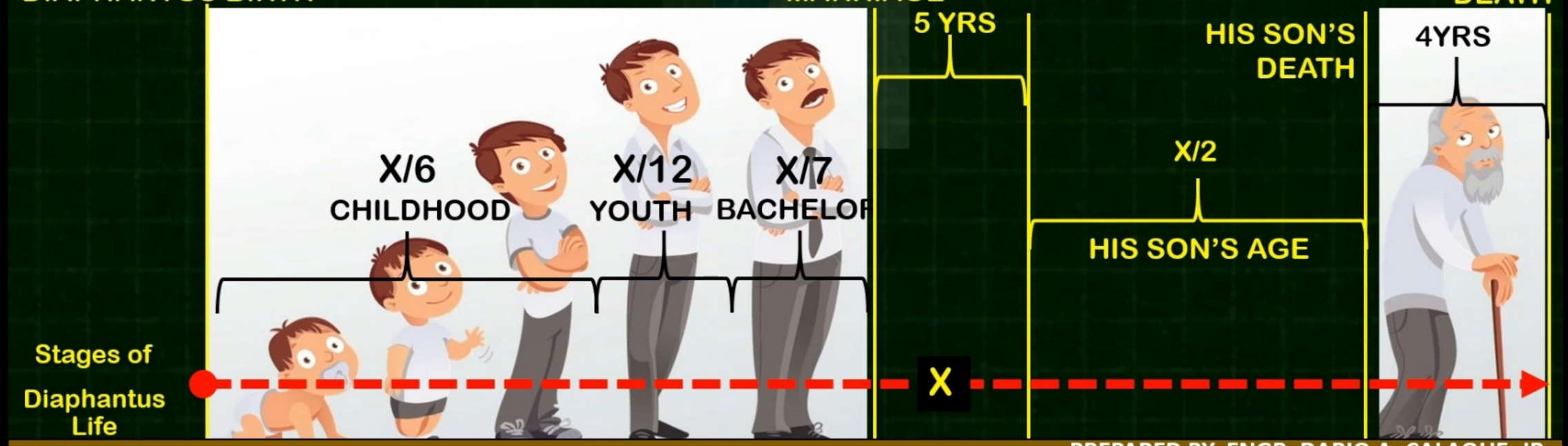
THE AGE OF DIAPHANTUS, A GREEK MATHEMATICIAN OF ABOUT 250A.D MAYBE CALCULATED FROM THE EPITAH WHICH READS AS FOLLOWS: "DIAPHANTUS PASSED ONE-SIXTH OF HIS LIFE IN CHILDHOOD, ONE-TWELVE IN YOUTH, AND ONE-SEVENTH AS A BACHELOR. FIVE YEARS AFTER HIS MARRIAGE WAS BORN A SON, WHO DIED FOUR YEARS BEFORE HIS FATHER AT HALF HIS FATHER'S FINAL AGE. HOW OLD WAS DIAPHANTUS WHEN HE DIED?

SOLUTION: Let X = Final Age of Diaphantus

Formulate Mathematical Equations:

Considering 2ND Statement:

"DIAPHANTUS PASSED ONE-SIXTH OF HIS LIFE IN CHILDHOOD, ONE-TWELVE IN YOUTH, AND ONE-SEVENTH AS A BACHELOR. FIVE YEARS AFTER HIS MARRIAGE WAS BORN A SON, WHO DIED FOUR YEARS BEFORE HIS FATHER AT HALF HIS FATHER'S FINAL AGE. HOW OLD WAS DIAPHANTUS WHEN HE DIED?

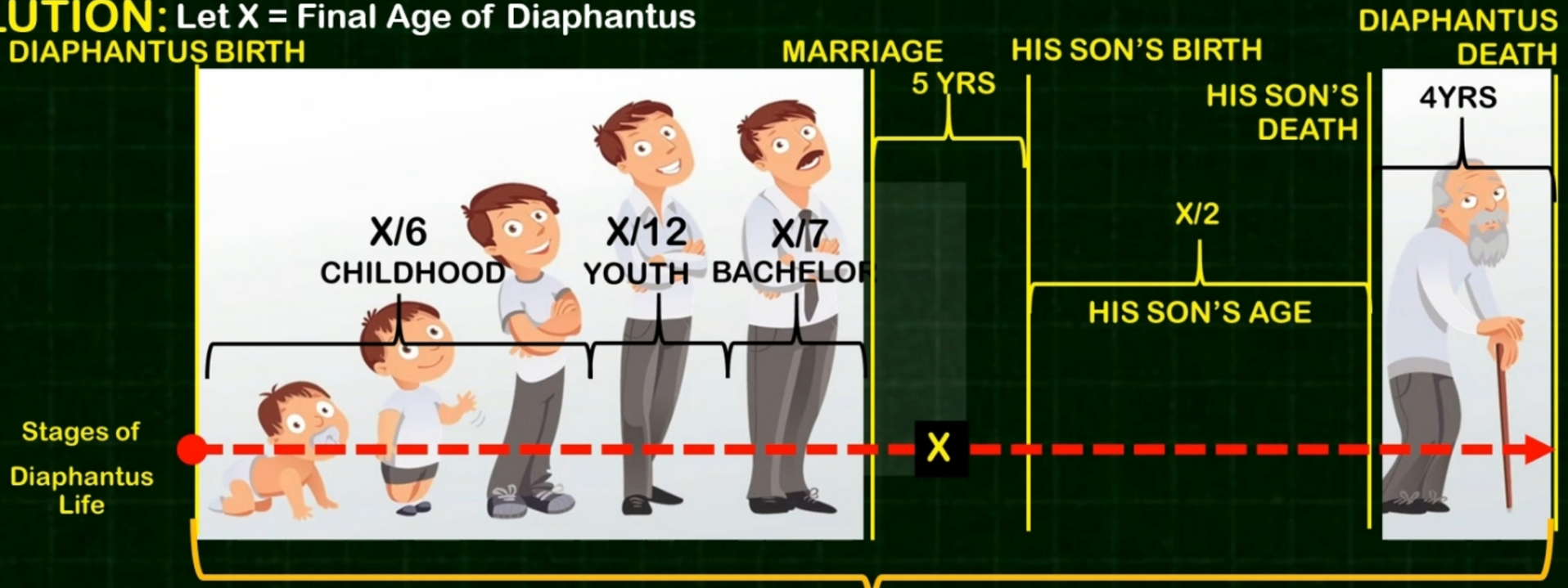


PREPARED BY: ENGR. DARIO A. CALAQUE, JR.

PAST CE BOARD EXAM:

THE AGE OF DIAPHANTUS, A GREEK MATHEMATICIAN OF ABOUT 250A.D MAYBE CALCULATED FROM THE EPITAH WHICH READS AS FOLLOWS: "DIAPHANTUS PASSED ONE-SIXTH OF HIS LIFE IN CHILDHOOD, ONE-TWELVE IN YOUTH, AND ONE-SEVENTH AS A BACHELOR. FIVE YEARS AFTER HIS MARRIAGE WAS BORN A SON, WHO DIED FOUR YEARS BEFORE HIS FATHER AT HALF HIS FATHER'S FINAL AGE. HOW OLD WAS DIAPHANTUS WHEN HE DIED?

SOLUTION: Let X = Final Age of Diaphantus



KEY EQT'N: $$X = \frac{X}{6} + \frac{X}{12} + \frac{X}{7} + 5 + \frac{X}{2} + 4$$

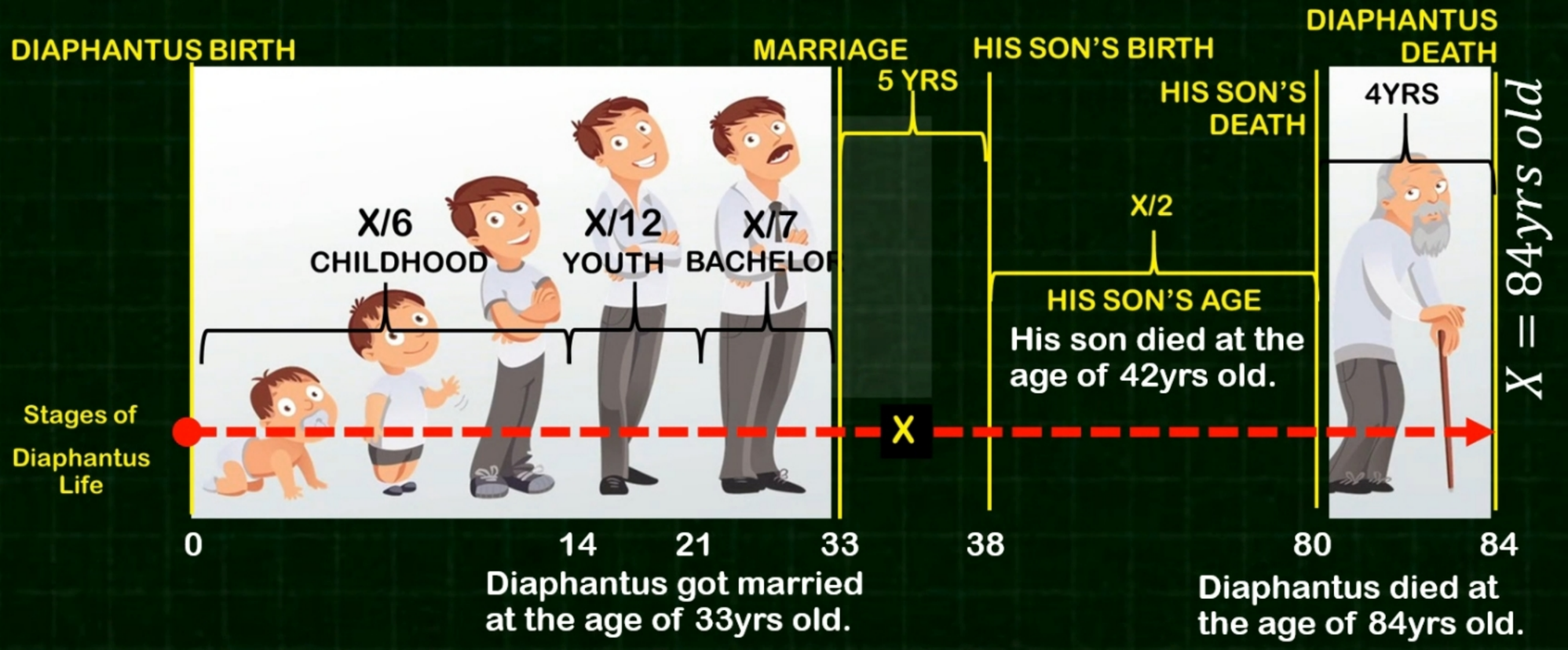
Solve for X: $$X = 84 yrs\ old$$

PREPARED BY: ENGR. DARIO A. CALAQUE, JR.

PAST CE BOARD EXAM:

THE AGE OF DIAPHANTUS, A GREEK MATHEMATICIAN OF ABOUT 250A.D MAYBE CALCULATED FROM THE EPITAH WHICH READS AS FOLLOWS: "DIAPHANTUS PASSED ONE-SIXTH OF HIS LIFE IN CHILDHOOD, ONE-TWELVE IN YOUTH, AND ONE-SEVENTH AS A BACHELOR. FIVE YEARS AFTER HIS MARRIAGE WAS BORN A SON, WHO DIED FOUR YEARS BEFORE HIS FATHER AT HALF HIS FATHER'S FINAL AGE. HOW OLD WAS DIAPHANTUS WHEN HE DIED?

EXPAND THE PROBLEM:



FACTS ABOUT DIAPHANTUS:

An arithmetic epigram from the Anthologia Graeca of late antiquity, purported to retrace some landmarks of his life (marriage at 33, birth of his son at 38, death of his son four years before his own at 84), may well be contrived.

Source:
https://www.britannica.com/biography/Diophantus